Total No. of Questions : 4]

SEAT No. :

PC-69

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T.E. (Mechanical/Mechanical-Sandwich) (Insem)

NUMERICAL AND STATISTICAL METHODS

(2019 Pattern) (Semester - I) (302041)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw the flow chart for Newton-Raphson method on iteration-based criteria. **[6]**

b) Solve the simultaneous equations using Gauss elimination method. **[9]**

$4y + 2z = 12$

$x + 3y + 5z = 0$

$3x + y + z = 11$

OR

Q2) a) The following polynomial has a root within the interval $3.75 \leq x \leq 5.00$; $f(x) = x^3 - x^2 - 10x - 8$ If a tolerance of 0.01 (1%) is required, find this root using bisection method. **[8]**

b) Solve the following set of simultaneous equations using Thomas Algorithm. **[7]**

$x + 2y = 3,$

$2x + 3y + z = 4,$

$2y - z = 1$

P.T.O.

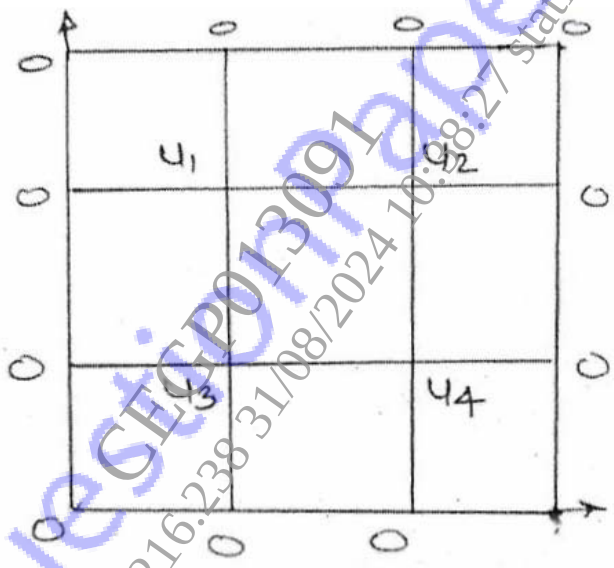
Q3) a) Using Runge Kutta method of fourth order, solve $dy/dx = y^2 + xy$ with initial condition $y(1) = 1$ at $x = 1.1$. Take $h = 0.05$. **[6]**

b) A steel plate of 750mm × 750mm has its two adjacent sides maintained at 100°C while the other two sides are maintained at 0°C. What will be the steady state temperature at interior assuming a grid size of 250 mm. **[9]**

OR

Q4) a) Draw the flow chart for Euler method for solving differential equations. **[5]**

b) Solve the Poisson's equation $\nabla^2 u = 2x^2y^2$ over the square domain $0 \le x \le 3$ and $0 \le y \le 3$, with $u = 0$ on the boundary and Mesh length = 1. **[10]**



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